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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,616	03/31/2001	Simon Knee	42390.P9020	6040

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EXAMINER

BILGRAMI, ASGHAR H

ART UNIT PAPER NUMBER

2143

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/823,616

Applicant(s)

KNEE ET AL.

Examiner

Asghar Bilgrami

Art Unit

2143

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |



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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/823,616  
Filing Date: March 31, 2001  
Appellant(s): KNEE ET AL.

**MAILED**

**FEB 24 2006**

**Technology Center 2100**

Gordon R. Lindeen III  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 11-21-2005 appealing from the Office action mailed 06-20-2005.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences, which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

Amendment after final was filed.

**(5) *Summary of Invention***

The summary of the claimed subject matter is contained in the brief.

**(6) *Grouping of Claims***

The rejection of claims 1-32 stand or fall together. See 37 CFR 1.192(c)(7).

**(7) *Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) *Prior Art of Record***

2002/0059197	Hunter et al.	04-2001
6,223,172 B1 *	Hunter et al.	06-1998

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\* *Patent Publication* 2002/0059197 used, as the prior art to reject the claims is a continuation of application 09/107,039 filed on Jun-29-1998, now a patent 6,223,172. All the limitations contained in 2002/0059197 are present in 6,223,172 B1 filed in 06-1998.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-32 are rejected under 35 U.S.C. 102(e). This rejection is set forth in a prior office action, mailed on 06-20-2005.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Hunter et al (U.S. Pub No 2002/0059197 A1).

3. As per claim 1, 16 & 23 Hunter disclosed a method of performing a longest match search comprising: receiving a search key, including an address; retrieving an encoded mask vector

from a mask table, the encoded mask vector corresponding to an address of the search key (page.5, Paragraph.61); determining a set of masks using the encoded mask vector that when applied to the search key are known to have a potential for matching an entry in a routing table (page 1, paragraphs 4 & 6); forming a routing table query based upon the search key and a mask of the set of masks, indicated by the encoded mask vector to be the longest mask of the set of masks; and applying the routing table query to the routing table (page 2, paragraph 33 & page 4, paragraph 48).

4. As per claim 2 & 24 Hunter disclosed the method of claim 1, further comprising: removing the longest mask from the set of masks; and continuing to apply additional routing table queries until either the set of masks is empty or a matching entry is found in the routing table (page 4, paragraph 48).

5. As per claim 3 & 25 Hunter disclosed the method of claim 1, wherein the search key address comprises an Internet Protocol (IP) address (page 1, paragraphs 6).

6. As per claim 4 & 20 Hunter disclosed the method of claim 3, wherein the IP address comprises a destination address (page 4, paragraphs 51).

7. As per claim 5 & 21 Hunter disclosed the method of claim 3, wherein the IP address comprises a source address (page 4, paragraphs 51).

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8. As per claim 6, 9, 18, 26 & 30 Hunter disclosed the method of claim 1, wherein the encoded mask vector has N bits and is capable of identifying N different length masks (page 6, paragraph 73).

9. As per claim 7, 17 & 27 Hunter disclosed the method of claim 1, wherein the longest mask of the set of masks is determined by the following equation:  $\text{Mask} = (0 - \text{MaskWord}) / \text{Mask Word}$ , where: Mask Word is an encoded mask vector, and Mask is the longest mask identified by Mask Word (page 4, paragraphs 55 & 56).

10. As per claims 8 & 29 Hunter disclosed a packet forwarding device comprising: a plurality of ports upon which packets are received and transmitted, the packet including an address; a routing processor coupled to the plurality of ports to determine an egress port of the plurality of ports for a packet received on an ingress port of the plurality of ports by performing a longest match search comprising one or more routing table queries, the routing table queries being based on the packet address and a mask indicated by an encoded mask vector of a mask table to be the longest mask of a set of masks determined using the encoded mask vector; a routing table, coupled to the routing processor, to provide the routing processor with a match indication and information regarding a matching routing table entry, if any, of a plurality of routing table entries stored therein in response to a routing table query;; and a mask table, coupled to the routing processor, to maintain encoded mask vectors corresponding to packet addresses, the encoded mask vectors identifying mask lengths of the plurality of routing table entries (page 3, paragraphs 41 & 42).

11. As per claims 10 & 31 Hunter disclosed the packet forwarding device of claim 8, wherein the routing table comprises a Content Addressable Memory (CAM) (page 3, paragraph 44).

12. As per claim 11 & 32 Hunter disclosed the packet forwarding device of claim 8, wherein the one or more routing table queries are formed by applying a series of masks determined with reference to the mask table to a search key extracted from the received packet (page 2, paragraph 33).

13. As per claim 12 & 19 Hunter disclosed a method of forwarding a packet comprising: receiving a packet on an ingress port of a plurality of ports; extracting a destination Internet Protocol (IP) address from a header of the packet; using a portion of the destination IP address to index into a mask table to retrieve an encoded mask vector that identifies a series of masks to be applied to the destination IP address during a longest match search of a routing table, the series of masks representing those masks that are known to have a potential for matching an entry in the routing table when applied to the destination IP address (page 3, paragraphs 41 & 42); identifying a longest matching entry in the routing table by performing the longest match search based upon the destination IP address and one or more of the series of masks; and forwarding the packet to a network device associated with the destination IP address via an egress port of the plurality of ports identified by the longest matching entry (page 4, paragraph 48).



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14. As per claim 13 Hunter disclosed the method of claim 12, wherein the portion of the destination IP address comprises the most significant N bits of the destination IP address (page 6, paragraph 73).

15. As per claim 14 & 22 Hunter disclosed the method of claim 12, wherein the encoded mask vector includes a plurality of mask length indicator bits that each indicate a mask length by virtue of their position within the encoded mask vector (page 4, paragraph 54).

16. As per claim 15 Hunter disclosed the method of claim 12, further comprising updating the mask table to include a new encoded mask vector in response to receiving a new routing table entry (page 5, paragraph 65).

17. As per claim 28 Hunter disclosed the method of claim 7, further comprising: isolating an endbit of the longest mask; combining the longest mask with the inversion of the longest mask left-shifted one position; and forming a subsequent routing table query based on the masked search key left shifted one position and the endbit (page 6, paragraph 68).

***(10) Response to Arguments***

The applicant argues the following issues regarding **claim 1** to support his position against the prior art Hunter, U.S Publication No. 2002/0059197 A2.

**Issue 1:**      **The applicant states (on page 6) that in rejecting the limitation “retrieving an encoded mask vector from mask table, the encoded mask vector corresponding to the address of the search key, determining a set of masks using the encoded mask vector” in claim 1 the examiner cited paragraph 73 of Hunter which does not disclose the limitation.**

As to applicants arguments the examiner notes that in the final office action dated 06-20-2005 the examiner cited paragraph 61 **not** 73 as stated by the applicant (see final office action).

Paragraph 61 states that when a masked search key is received it is compared with the hash bin which is an entry in the hash table 550 (see figure 5) and a determination is match has been found made as to weather or not. To further explain the teachings of the claimed invention with the prior art Hunter in paragraphs 17, 47 & 51 described a method and apparatus for performing longest match search on an address. In paragraph 18 Hunter describes that Data (e.g. search request or forwarding request) is received at a port (of a device e.g. router or switch) from which the address (header) is extracted from the data. Hunter describes retrieving the encoded mask vector from a mask table {hash table} in Paragraphs 53 & 54 and figure 5. Additionally Hunter describes the Address resolution Unit that includes a Hash table 550 contains plurality of bins,

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each, of which may include one or more address records (also referred as forwarding addresses).

A hash collision occurs when two or more entries in the hash are same. When a hash bin collision occurs, the entries in the bin should be ordered from the longest mask first to shortest mask last to assure the first match found is the longest.

**Issue 2: The applicant states (on page 6) that in rejecting the limitation “forming a routing table query based upon the search key and the longest mask of set of masks, indicated by the encoded mask vector to be the longest mask of the set of mask.” In claim 1 the examiner cited paragraphs 41 & 42 of Hunter, which does not disclose the limitation.**

As to applicants arguments the examiner notes that in the final office action dated 06-20-2005 the examiner cited paragraphs 33 & 48 not 41 & 42 as stated by the applicant (see final office action). Paragraph 48 describes in figure 3 a longest match search of a routing table includes three matching network prefixes of varying lengths, it also states that in order to assure proper delivery of the packet the device must use the most specific matching entry i.e. the entry having the longest mask. Additionally Hunter in paragraphs 53 & 54 described the Address Resolution Unit, which includes address resolution state machine 525 which controls hash index generation

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based on search key, typically an address from a packet header and the data in or pointed by the hash table 550, and comparisons between the two.


Respectfully submitted,



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Art Unit 2143  
February 14, 2006



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